COMPREHENSIVE STUDY OF PAROTID NEOPLASMS

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CERTIFICATE

This is to certify that **Dr.S. SASIKUMAR** post graduate student during the period 2004 - 2007 in the Department of General Surgery, Killpauk Medical College, Chennai has done this dissertation titled **"COMPREHENSIVE STUDY OF PAROTID NEOPLASMS"** under the direct guidance and supervision in partial fulfillment of the regulations laid down by the Tamilnadu Dr.M.G.R. Medical University, Chennai, for M.S., Branch-I General Surgery degree examination.

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CONTENTS

INTRODUCTION

The study of tumours of parotid gland is a fascinating and a novel one but sometimes this seemingly familiar disease remains a trouble to both the patient and the surgeon. There is a real threat of injuring the facial nerve, but with a striking change in the attitude of medical profession towards proper understanding of anatomy of parotid, especially of facial nerve and its intricate relationship to the gland, the danger is becoming less nowadays. Similarly thorough knowledge about various characteristics of each type of tumour arising from parotid and their response to various modalities of treatment is necessary for adequate management of these neoplasms.

AIM OF THE STUDY

The following are aims of our study:

- To analyze the incidence of different tumours occurring in parotid gland.
- To study the mode of presentation of benign and malignant neoplasms.
- To study the accuracy of FNAC in diagnosing the tumours preoperatively.
- To identify any common predisposing factors.
- To monitor the post operative facial nerve weakness.

HISTORICAL BACKGROUND

It is surprising to note that little was known about the parotid gland until the middle of seventeenth century. Interestingly, NIELS STENSON, in 1660, while dissecting in Amsterdam, discovered and described the duct of parotid gland in sheep's head which now bears his name.

The first published reports of tumors of parotid gland are generally credited to C.G.SIEBOLD, in 1793 and I.P.SIEBOLD, in 1797. SIEBOLD's first operation was done in 1781.

AUGUSTE BERNARD published the important treatise on classification and about the tumours of parotid gland in 1841. BILLROTH in 1859 published some articles describing the parotid tumours so well that his intricate details could very well be used even today. The first attempt at total parotidectomy with preservation of nerve was made by CODREANU in 1892.

VILRAY BLAIR in 1912, SISTRUNK in 1921, ADSON in 1923 and BAILEY in 1941 demonstrated various methods to protect the nerves.

RADON of France did the first conservative surgery in 1934, JAMES in 1934, BAILEY in 1935 and DAVID PATEY in 1965 in modern times.

SURGICAL ANATOMY AND PHYSIOLOGY

DEVELOPMENT OF PAROTID GLAND

The parotid gland is derived from the **ectodermal** covering of maxillary process of the first branchial arch. At the 6th week of embryonic life, an epithelial bud appears near the angle of mouth in the groove that eventually marks the separation between cheek and alveolus. At about 7th week the bud elongates towards the ear and becomes hollowed into a tunnel which will eventually become the parotid duct. The blind end of the tunnel proliferates to form the body of parotid gland. While acinar cells can be found at the age of 5 months, differentiation of the gland is incomplete until sometimes after birth.

ANATOMY

The parotid gland is situated below the external auditory meatus and lies in the deep hollow behind the ramus of mandible and in front of the sternocleidomastoid.

As seen from the superficial surface, the parotid gland is roughly wedge shaped with base above and apex behind the angle of mandible.

SURFACE	BORDERS
1. Apex	
2. Base or superior surface	1. Anterior
3. Superficial surface	2. Posterior
4. Anteromedial surface	3. Medial
5. Posteromedial surface	

RELATIONS

The **apex** overlaps the posterior belly of the digastric and the adjoining part of the carotid triangle. The cervical branch of the facial nerve and the two divisions of the retromandibular veins emerge through it.

The **base or superior surface** forms the upper end of the gland, which is small and concave. It is related to:

1. The cartilaginous part of the external acoustic meatus.
2. The posterior surface of the temporomandibular joint.
3. The superficial temporal vessels.
4. The auriculo-temporal nerve which winds round the mandibular neck, embedded in the glands capsule.

The **superficial surface** is the largest of all surfaces. It is covered with:

1. Skin
2. Superficial fascia, which contain facial branches of the greater auricular nerve, superficial parotid lymph nodes, the posterior border of platysma.
3. The parotid fascia, which is thick and adherent to the gland.
4. Few parotid lymph nodes embedded in the gland. It extends upwards to the zygomatic arch, back to overlap the

stemocleidomastoid, down to its apex posteroinferior to the mandibular angle and forwards to superficial to the masseter below the parotid duct.

The **anteromedial surface** is grooved by the posterior border of the mandibular ramus. It is related to:

1. Masseter
2. The lateral surface of the temporomandibular joint.
3. The posterior border of the ramus of the mandible.
4. The medial pterygoid.
5. The emerging branch of the facial nerve.

The **posteromedial surface** is mounded to the mastoid process, sternocleidomastoid, posterior belly of the digastric and the styloid process and its muscles. Thus it is related to:

1. The mastoid process with the sternomastoid and posterior belly of digastric.
2. The styloid process with the structures attached to it.
3. The external carotid artery enters the gland through this surface.
4. The internal carotid artery lies deep to the styloid process.

The **anterior border** separates the superficial surface from the anteromedial surface. It extends from the anterior part of the superior surface to the apex. The following structures emerge at this border:

1. The parotid duct.
2. Most of the terminal branches of the facial nerve.
3. Transverse facial vessels.

In addition the ACCESSORY PAROTID GLAND lies on the parotid duct close to its border.

The **posterior border** separates the superficial surface from **the** posteromedial surface. It overlaps **the sternomastoid.**

The **medial border** separates the anteromedial surface from the posteromedial surface. It is related to the lateral wall of the pharynx.

The superior margin of the gland extending upwards behind the TM joint into the posterior part of mandibular fossa is called as **the 'GLENOID PROCESS'.**

The anterior margin of the gland extending forwards superficial to the masseter muscle to form **the 'FACIAL PROCESS'.**

The deep part of the gland extending forwards between the medial pterygoid muscle and the ramus of the mandible to form **the 'PTERYGOID PROCESS'.**

Structures within the parotid gland

The structures within the parotid gland from medial to lateral are:

1. Artery
2. Veins
3. Facial nerve

1. Arteries

The external carotid artery enters the gland through its posteromedial surface. The maxillary artery leaves the gland through its anteromedial surface. The superficial temporal artery after its branch Transverse facial branch in the gland ascends to leave its upper limit.

2. Veins

The retromandibular vein is formed within the parotid gland by the union of the superficial temporal and **maxillary** veins. In the lower part of gland it divides into anterior and posterior divisions, which leave the lower part of the gland. The anterior division joins the facial vein and the posterior division unites with the posterior auricular vein to form the external jugular vein.

3. Facial nerve

The facial nerve leaves the stylomastoid foramen and enters the parotid gland through the upper part of its posteromedial surface and divides into its five terminal branches. The five branches of the facial nerve are:

1. Temporal branch

2. Zygomatic branch

3. Buccal branch

4. Mandibular branch

5. Cervical branch

Within the parotid gland these three structures are placed in such a manner that the artery lies in the deepest plane, the vein in the middle, and the facial nerve in the superficial plane. Within the parotid gland, the facial nerve and the retromandibular vein divide the gland into superficial and deep part by the **PATEY's FACIO-VENOUS PLANE.**

CAPSULES OF THE PAROTID GLAND

The parotid gland is a lobulated mass surrounded by a connective tissue capsule. In addition, the gland is enclosed in a dense fibrous capsule derived from the investing layer of deep cervical fascia.

PAROTID DUCT (STENSON DUCT)

The parotid duct is about 5cm long and 5mm in diameter, begins by the confluence of two main tributaries within the anterior part of the gland, then crosses the masseter and at its anterior border turns medially at almost at right angle, traversing the corpus adiposum (Suctorial pad of infants) and the buccinator. It then runs obliquely forwards for a short distance between the buccinator and the oral mucosa, which serves as a valve like mechanism and

prevents the **inflation** of duct during violent blowing and open upon a small papilla opposite the crown of upper second molar teeth.

While crossing the masseter it receives the accessory parotid duct and here lies between the upper and lower buccal branches of the facial nerve. The accessory part of the gland and the transverse facial artery are above it. The buccal branch of the mandibular nerve, emerging from beneath the temporalis and masseter is just below the duct at the masseter's anterior border.

The wall of parotid duct is thick, with n external fibrous layer consisting non striated muscle and a mucosa lined by low columnar epithelium.

VESSELS AND NERVES

The parotid arterial supply is from the external carotid artery and its branches in and near the gland. The veins drain to the external jugular through local tributaries. The lymph vessels end in the superficial and deep cervical lymph nodes.

The efferent innervation is autonomic consisting of sympathetic fibers from the external carotid plexus.

The parasympathetic fibers which reach it via the tympanic branch of the glossopharyngeal nerve relaying in the otic ganglion and then travelling along the auriculotemporal nervc. The preganglionic fibres begin in the inferior salivary nucleus and passes through the 9^{th} nerve, its tympanic branch, the tympanic plexus and the lesser petrosal nerve, and relay in otic ganglion. The post ganglionic fibres pass through the auriculotemporal nerve and reach the gland.

The parasympathetic nerves are secretomotor.

The sympathetic nerves are vasomotor.

The sensory nerves to the gland come from the auriculotemporal nerve. But the parotid fascia is innervated by the sensory fibres of the greater auricular nerve.

PAROTID LYMPH NODES

The parotid lymph nodes partly lie in the superficial fascia and partly deep to the deep fascia over the parotid gland. They drain:

1. The temple
2. The side of scalp
3. The lateral surface of auricle
4. The external acoustic meatus
5. The middle ear
6. The parotid gland
7. The upper part of the cheek
8. The parts of the eyelid
9. The orbit

The efferent from these nodes pass to the upper group of deep cervical nodes. The deep nodes lie between the gland and the sidewall of pharynx and they drain:

1. The nasopharynx

2. Back of nose.

SURFACE ANATOMY

The parotid duct can be felt on the face or in the vestibule of the mouth more easily and rolled on the anterior border of masseter, by pressing fingers backward on it (with the teeth clenched to make the muscle tense)

The anterior border of the parotid gland is represented by a line descending from the mandibular condyle to a point 2 cm inferoposterior to the angle of mandible. Its concave upper border corresponds to a curve from the mandibular condyle across the ear lobule to the mastoid process. The posterior border is indicated by a straight line between the ends of anterior and upper border.

The parotid duct corresponds to the middle third of a line drawn from the lower border of tragus to a point midway between the nasal a1a and the upper labial margin.

PATHOLOGY OF PAROTID TUMOURS

In view of their relatively undistinguished normal morphology, the parotid gland give a surprising variety of benign and malignant tumours. There are many classification detailing the different tumours arising in the parotid gland. The widely followed are the WHO classification. The four important classification are given below:

1. Foote and Frazell (1954)
2. Patey's
3. Schwartz's classification
4. International classification

I.FOOTE AND FRAZELL'S CLASSIFICATION

A. Benign parotid tumours approximately 75%:

1. Mixed parotid tumours
2. Papillary cystadenoma lymphomatosum
3. Oxyphil/acinic cell adenoma
4. Benign lymphopepithelial lesion
5. Hemangioma
6. Others.(Iipomo,neurofibroma,etc.)

B. Malignant parotid tumours approximately 25%:

1. Mucoepidermoid tumours
    a. low grade
    b. high grade
2. Adenocarcinoma
    a. classic
    b. trabecular
3. adenoid cystic carcinoma (cylindroma)
4. acinic cell carcinoma
5. Malignant mixed tumours
6. squamous cell carcinoma
7. undifferentiated
8. unclassified (melanoma,lymphoma)
9. miscellaneous
10. metastatic tumour
11. others

II. PATEY'S CLASSIFICATION:

a. Those that grow by expansion

1. Mixed parotid tumours
2. adenolymphoma
3. cysts

b. Those that grow by infiltration:

1. recurrent mixed tumour
2. cylindromas
3. mucoepidermoid tumours
4. carcinoma

III. SCHWARTZ'S CLASSIFICATION

a. Benign:

1. mixed parotid tumours
2. papillary cystadenoma lymphomatosum
3. oxyphil adenoma (oncocytoma)
4. Mickulicz's disease
5. asymptomatic enlargements

b. Malignant:

l. from acinar epithelium:

a. adenoid cystic carcinoma

b. acinar cell adenocarcinoma

c. anaplastic adenocarcinoma

2. from ductal epithelium:

a. high grade

b. low grade

3. malignant mixed tumour

4. miscellaneous lesions.

IV. WHO CLASSIFICATION

A. EPITHELIAL TUMORS

ADENOMA

l. Pleomorphic adenoma

2. Warthin tumour

CARCINOMA

1. Acinic cell neoplasm

2. Mucoepidermoid carcinoma

3. Adenoid cystic carcinoma

4. Adenocarcinoma
5. Squamous cell carcinoma
6. Undifferentiated carcinoma
7. Carcinoma in pleomorphic adenoma

B. NON EPITHELIAL TUMORS

1. Haemangioma
2. Lymphangioma
3. Neurofibroma
4. Neurilemmoma
5. Malignant lymphoma

PATHOLOGIC FEATURES OF DIFFERENT TUMOURS

BENIGN TUMOURS

INCIDENCE : Approximately 80% of all parotid neoplasms are benign and 80% of the benign tumours are pleomorphic adenoma.

1. PLEOMORPHIC ADENOMA: (mixed tumor)

The term mixed tumor was used by Minsen (1874) to stress the dual origin of this type of growth from epithelial and mesenchymal elements. The pleomorphic adenoma occurs most frequently in the 4^{th} to 6^{th} decade as a painless, single, slow growing, moderately firm, movable, smooth nodule or mass.

Although usually single, multiple mixed tumors have been reported. In the parotid gland, about 90% arise in the tail of superficial part, but about 10% have their origin in the deep portion.

Numerous **theories** have been postulated:

1. Mesenchymal
2. Branchiogenic
3. Embryonal gland anlagen
4. Adult epithelial or myoepithelial tissue
5. Histogenesis from intercalated duct

Two types of **mucin** have been demonstrated:

1. An epithelial type, elaborated by glandular structures.
2. A mesenchymal type, found in myxomatous areas produced by the myoepithelial cells.

GROSSLY

The pleomorphic adenoma is rounded to bosselated with recurrent growth tend to multilobulated. Although it appears to have fibrous capsule, it is not truly encapsulated, a condition responsible for high rate of recurrence. Most tumors are 2 to 5cm in size.

MICROSCOPIC APPEARANCE

Wide variety of patterns found

1. Epithelial cells proliferate in strands and some take on duct like **arrangements. Materials found in the duct like lumina is some** cases resemble Colloid, and in others **mucin.** The former has been called **EPITHELIAL MUCIN** whereas the latter is **MYOEPITHELIAL MUCIN.**

2. Others cells, probably of myoepithelial origin proliferates in sheets. This myoepithelial product may simulate cartilage.

3. In parts of the tumor a mucoid material is produced which separates the cells producing a myxomatous appearance and then an appearance resembling cartilage.

4. Myxoid areas occur in 90% whereas overl/3rd exhibits such an areas as dominant feature.

5. One half contain pseudocatilage, true cartilage and rarely even bone.

6. squamous epithelial masses are seen in 25%.

7. Pseudoadenoid arrangements of epithelial cells resembling adenoid cystic carcinoma in 10%.

8. Sebaceous glands or tyrosine crystals may be seen.

9. Calfication may be seen in old tumors.

MONOMORPHIC ADENOMAS

ADENOLYMPHOMA OR WARTHIN'S TUMOR OR PAPILLARY CYSTADENOMA LYMPHOMATOSUM

Warthin's tumor is a benign tumor, arising most commonly in the lower portion of the gland overlying the angle of mandible. It forms 10% of all parotid neoplasms. Men are chiefly affected, more common between 40 to 70 years of age. About 7% of tumors occur bilaterally. Rarely an extraparotid lesion and malignant variant has been described.

HISTOGENESIS OF WARTHIN'S TUMOR

One theory is that tumor represents neoplastic proliferation of heterotopic salivary gland rests entrapped during growth and development in lymph nodes adjacent to or within the parotid gland. However because the amount of lymphoid tissue is far greater than that of a small lymphocyte in which the tumor theoretically originated. There is current support for this hypothesis that the proliferating epithelial cells somehow cause the accumulation of lymphoid tissue and the differentiation of IgA plasma cells.

MICROSCOPIC APPEARANCE

The essential components of this neoplasm are **EPITHELIAL PARENCHYMA** and **LYMPHOID STROMA** The parenchymatous tissue is composed of tubules and dilated cystic spaces into whose lamina project slender finger like papillary process giving the neoplasm characteristics appearance. The stroma contains lymphoid tissue including lymph follicles/T & B lymphocytes show a normal distribution ratio.

OXYPHIL GRANULAR CELL ADENOMA OR OXYPHIL

ADENOMA OR ONCOCYTOMA

This rare benign tumor constitutes less than 1% of all parotid neoplasms. The true tumors are slow growing behaving rather like pleomorphic adenoma. Most patients are between 55 and 75 years of age occurring most commonly in women.

The oncocytoma is well circumscribed, smooth surfaced rather firm.

MICROSCOPIC FEATURE

The cells are monotonous, pink, plump and polyhedral with nucleus round & centrally located. The most common arrangement of the cells is in broad parallel columns, acinar or tubular formation. There are no lymphoid cells in the true oncocytoma.

PAPILLARY CYSTADENOMA

This rare tumor consists of gland like spaces lined with tall columnar epithelium having eosinophilic cytoplasm. Mucin is commonly produced and may fill the gland like spaces.

HEMANGIOMA

This is the most common parotid tumor during the first year of life usually appearing within the first three months. Skin hemangioma overlie the parotid tumor in about 40% of patients with male : female ratio of 3:1.

Histologically, the hemangioma is composed of capillary vessels lined by two or more layers of endothelial cells and is never encapsulated but infiltrates the gland, replaces the acini and leaves only the ductal elements. Spontaneous regression is usual and recurrence following surgery is rare.

LYMPHANGIOMA

There are three types **of lymphangioma**

1. simple lymphangioma
2. Cavernous lymphangioma
3. Cystic hygroma

The thin walled lymph spaces invade the parotid and adjacent tissue and do not replace glandular parenchyma. The tumor is soft, fluctuant and transluminant.

TUMORS OF VARIABLE MALIGNANCY

MUCOEPIDERMOID TUMOR

Since the time the tumor was described, debate has continued about its biological classification. This can be summarized as follows:

A. One view is that it is always a carcinoma whose behavior is related to its histology. Low grade or well differentiated tumors act like benign mixed cell tumors, intermediate are aggressive and high grade or undifferentiated tumors metastasize early and carry a poor prognosis.

B. The more recent view is that behavior is not related to its histological appearance and apparently benign ones can eventually metastasize, while initially aggressive ones can disappear with appropriate treatment. For this reason only the term "TUMOR" is applied rather than "CARCINOMA".

About 5-10 % of major salivary gland tumor and 10% of minor salivary gland tumor are mucoepidermoid tumor. Within the major salivary gland 90% of these arise in the parotid gland. The tumor is painless, firm, non tender and slow growing with rare involvement of facial nerve. There appears to be no sex predilection.

MICROSCOPIC FEATURES:

It is composed of epidermoid cells mucous secreting cells and cells of intermediate type. The presence of small cysts is common in well-differentiated tumors. Even the well differentiated has the capacity to metastasize.

The varied cell types suggest that the tumor arises from ductal epithelium with marked potential for varied differentiation and metaplasia.

2. ACINIC CELL TUMOR

This relatively rare tumor comprises about 2-3% of all parotid neoplasms or 10-20% of malignant parotid tumor. For every 6 cases in parotid gland, there is one in the submandibular gland and one in the oral minor salivary gland. There is slight female preponderance. The tumor is firm,

rounded occurring most often in the lateral portion or tail of parotid, well encapsulated in less than 15%of cases, slow growing but has tendency to recur, especially when poorly encapsulated. Local recurrence occur in about 15% and is usually multiple. Metastasis occur most frequently to lymph nodes, lungs, bone and brain.

A poor prognosis seems to be correlated with:

- size of tumor
- Involvement of deep lobe
- Amount of nuclear atypia and mitosis
- Absence of capsule

Less than 3% of patients complain of pain but facial nerve involvement is rare.

The tumor most commonly occurs in the 3rd - 4th decade.

MICROSCOPIC FEATURES

Acinic cell carcinoma is composed of varying proportions of one or more cell types

- Acinic cells
- Inter calatcd cell
- Vacuolated cells
- Non specific glandular

The cells form large lobules with little intervening stroma suggests that the tumor arises from pluripotent duct cells, most likely the intercalated or terminal duct cells. Various growth patterns are seen.

- Solid
- Microcystic
- Papillary - cystic
- Follicular

The stroma is scanty. The PAS positive material may be present, especially in microcystic areas, A lymphoid stroma is occasionally present representing origin in intra parotid lymph node. Some tumors resemble adenocarcinoma of kidney.

MALIGNANT TUMORS

1.ADENOID CYSTIC CARCINOMA:(CYLINDROMA)

This constitutes about 5-10% of all parotid gland tumors with slight female predilection. Most patients are between 30-70 years of age and peak incidence at 6^{th} decade.

The tumor is slow growing of moderate to low grade malignancy but is widely infiltrative and poorly encapsulated. Patients with tumors complain of pain in about 40% cases. The tumor is usually small (2-4cm), firm, homogenous and grayish white in cross section.

MICROSCOPIC FEATURES

It manifest with varying pattern of small darkly staining cells with scanty cytoplasm. The pattern most often seen are:

1. Cribriform pattern is characterized by nests of tumor cells with **swiss cheese configuration** may be noted.

2. Trabecular pattern is characterized by elongated tubular structures having a central lumen.

3. Solid pattern consists of individual unit of variable size completely filled with cells exhibiting new lumina.

Recurrences have been noted in 60% with predominantly tubular pattern,.90% with cribiriform pattern and 100% with solid pattern. The overall salvage rate is 50%. Facial nerve involvement is common with invasion of perineural lymphatics readily demonstrated. This finding is correlated with poor prognosis.

ADENOCARCINOMA

This does not differ from the adenocarcinoma of other organ. The cells are arranged in ducts or tubules and the tumour cells infiltrate the blood, lymphatics and perineuarl spaces. The adenocarcinoma producing much must be differentiated from mucoepidermoid carcinoma. The tumor is firm, may be papillary or non-papillary and mucous secreting or non-mucous secreting.

The incidence is 3% with no sex or age predilection. The 5-year survival rate is 40%. The prognosis depends on the degree of differentiation.

CARCINOMA IN PLEOMORPHIC ADENOMA

(MALIGNANT MIXED TUMOR)

By definition this tumor is a binary combination of benign mixed tumor and a malignant neoplasm, most often poorly differentiated adenocarcinoma.

It may comprise as much as 2-5% of all tumors. There appears to be 3:1 female sex predilection with age incidence ranges from 35-85 years, mean age of 60 years. This is about 10 years older than the mean age for benign mixed tumor.

MICROSCOPIC FEATURES

The pleomorphic adenomatous portions are in no way atypical but the malignant areas vary considerably from tumor to tumor. Some exhibit considerable atypia. The cells are arranged in into small nests or tubules or sheets. Perineurial invasion and infiltration into adjacent connective tissue or fat are noted in 60-80% cases.

Local recurrence have been noted in 50% the 5-year survival rate is 55%. Metastses most often occur to lymph nodes, lungs or bone.

SQUAMOUS CELL CARCINOMA

Like mucoepidermoid tumors, these also originate in ductal epithelium and undergo squamous metaplasia.

MICROSCOPIC FEATURES

Share usual features of squamous cell carcinoma elsewhere.

UNDIFFERENTITED CARCINOMA

It consists of sheets or cords of anaplastic epithelial cells surrounded by varying amount of fibrous stroma.

It constitutes about 3-5% of all parotid tumors. Although it may occur at any age, it is most commonly seen in the $7^{!h}$ or 8^{Ih} decade with no sex predilection.

MICROSCOPIC FEATURES

It is so undifferentiated that it cannot be otherwise classified. It is composed of compact cell masses that vary in size. Mitosis is frequently abundant. Wide spread metastases to lung, bone and liver. The 5-year survival rate is 25%.

RARE TUMORS

SARCOMA

It may be part of the malignant mixed tumor spectrum but salivary glands can also be involved in osteogenic and chondrosarcoma of the mandible.

LIPOMA

This must be differentiated from fatty infiltration which is usually bilateral. It lies lateral to the parotid but the rare tumor of brown fat, the hibernoma can occur in parapharyngeal space. Removal is uncomplicated

unless it extends into the anterior compartment of face, in which case the terminal branches of facial nerve is at risk.

METASTAT1C TUMOR

The parotid lymph nodes may be involved by spread from carcinoma of scalp and facial skin especially melanoma. Adenocarcinoma from the digestive tract or urogenital system may present as parotid gland metastases.

SALIVARY GLAND HETEROTOPIA

Heterotopic islands of salivary gland tissue have been described in a number of sites in the head and neck, pituitary gland, middle & external ear, mastoid bone, thyroglossal duct cyst, capsules of thyroid & parathyroid glands, mandible, lymph node and the sternoclavicular joint.

BASAL CELL ADENOMA

It is a monomorphic tumor of salivary gland occurs as circumscribed nodules in patient between 50-75 years of age with no sex predilection. The basal cell adenoma differs from pleomorphic adenoma morphologically by **the absence of myoepithelial cells.**

MICROSCOPIC FEATURES

it has been classified into:

1. trabecular-tubular
2. Canalicular
3. Basaloid

Ultrastructural studies have suggested origin from the intercalated duct. It may represent the benign analog of adenoid cystic carcinoma.

Sabaceous lymphadenoma, sebaceous carcinoma, sebaceous adenoma

The tumor is composed of proliferated sebaceous glands in the matrix of normal appearing lymphoid tissue, suggesting its development from intra parotid lymph node.

CLINICAL FEATURES AND DIAGNOSIS

Clinical expressions of parotid rumors may be in varied forms. **Symptoms** may be :

- Unilateral swelling of the face, occasionally bilateral in case of Warthin's tumor, slow growing and rapid increase in size indicate malignancy.
- Pain which is characteristic feature of inflammatory condition. Sometimes malignant tumors may present with pain which may be local or referred pain in the face or ears.
- Paresthesia as a result of nerve infiltration.
- Paralysis of facial muscles as a result of infiltration by tumor of facial nerve.
- Dysphagia due to deep lobe involvement casing bulge in the soft palate and parapharyngeal wall.
- Trismus due to infiltration of masseter, pterygoid and involvement of temporomandibular joint.

Features

- Cranial nerve deficits- as adenoid cystic carcinoma can spread perineurally through the base of skull and involve the cranial nerves.
- Chest pain, dyspnoea, hemoptysis - due to metastasis to lungs, commonly in adenoid cystic carcinoma.

The age of the patient is obviously important because mumps is much co commoner in children than in adults. Although mumps can be predominantly unilateral, the presentation should make one suspect a diagnosis of congenital sialectasis than mumps especially if it happens twice.

It is important to establish if the condition affects one gland or more than one. Tumors are unilateral apart from Warthin's on very occasions. Sialectasis also usually affects only one parotid gland although bilateral submandibular involvement is sometime seen. Diffuse enlargement (sialomegaly) is caused not only by sialectasis but also benign lymphoepithelial lesions, drug allergies, and a number of systemic conditions.

If the swelling is related to eating then it is likely be due to calculous disease secondary to sialeclasis. No other sialomegaly is related to eating.

The duration of swelling due to calculi is variable and may last from under an hour to several days. The benign tumors grow slowly although if bleeding occurs inside a cystic tumor, such as pleomorphic adenoma, then the patient may become alarmed by a growth spurt. The malignant tumors increase in size fairly rapidly and are often associated with facial nerve weakness.

Pain is characteristic feature of duct obstruction by a calculus or infection. Benign lymphoepithelial lesion is often uncomfortable rather than painful, as are allergic reactions. Adenoid cystic carcinoma typically presents with pain which may result in patient seeking various disciplines associated with facial pain.

Systemic conditions such as myxoedema, diabetes, Cushing's, disease, hepatic cirrhosis, gout, alcoholism may be associated with the painless sialomegaly. More recently parotomegaly as a feature of bulimia and AIDS has been reported. Drugs such as thiouracil, phenylbutazone. Isoprenaline, distalgesicand high estrogen contraceptive pills can also cause sialomegaly.

Finally enquiry should be made into other symptom the patient may have, because sarcoidosis and tuberculosis can enlarge a gland as can hydatid disease.

Character	Benign	Malignant
Duration	Long standing	Recent origin
Rate of growth	Very slow	More rapid
Size	Large	Smaller
Pain	Absent (except in inflammatory)	Present 25%
Tenderness	Infrequent	Frequent
Consistency	Rubbery hard to soft	Stony hard
Attachment	Mobile	Fixed
Lymph nodes	Not involved	Involved and diagnostic
Facial nerve	Not involved	Involved and diagnostic
Limitation of mandibular movement due to invasion of jaw and masticatory muscle	Not present	Present in advanced cases.
Anaesthesia of skin or mucous membrane.	Not present	May be present
Resorption of adjacent bone	Absent	Maybe present

PHYSICAL EXAMINATION

INSPECTION should reveal which area is involved and whether it is one or more gland, local or diffuse swelling, skin involvement make one to suspect malignancy, as also facial nerve weakness.

PALPATION decides whether it is solid or cystic. Cystic masses may be Warthin's tumor, cystic pleomorphic adenoma, branchial cysts, and parasitic cysts. Solid tumors can be smooth or irregular but this helps little as to the diagnosis because pleomorphic adenomas are often irregular and knobby. Benign tumors are always mobile and any fixation should raise strong suspicion of malignancy. In assessing any parotid mass one should ask the patient to clench his teeth so that the masseter is contracted. This allows one to assess if the swelling is infact a hypertrophied masseter and it allows one to see whether or not the mass is inside the muscle or outside it. Complete examination of all the salivary glands is essential to decide whether or not other glands are affected. Pharynx and oral cavity examination should also be done. Paraphayngeal tumors are either dumb-bell, in which case they present in pharynx and also in the superficial lobe of parotid or deep lobe only, in which case they present primarily in the pharynx pushing the tonsil and/or palate medially.

Clinical diagnosis of a salivary gland tumor is usually not difficult but the following rarities should be kept in mind since they mimic sialomegaly:

- Hypertrophied masseter
- Winged mandible (in the first arch syndrome)

- Dental cysts
- Branchial cysts
- Myxoma of the masseter
- Neuroma of the facial nerve
- Facial vein thrombosis
- Temporal artery aneurysm
- Lipoma
- Lymphangioma
- Mandibular tumor
- Mastoiditis
- Lymphadenitis of pre-auricular node
- Sebaceous cyst

INVESTIGATIONS

- **ROUTINE INVESTIGATIONS**
- **SPECIAL INVESTIGATIONS**

ROUTINE INVESTIGATION

1. To assess the patient for surgery.
2. To exclude other conditions.
3. As a base line investigation for other modalities of treatment like chemo/radiotherapy.

SPECIAL INVESTIGATIONS

1. To locate the tumor
2. To exclude extra-parotid mass
3. To confirm diagnosis.

LABORATORY TESTS

1. Diabetes
2. Myxoedema
3. Cushing's disease

4. Rheumatoid factor and hyper gamma globulinemia are often found in Sjogren's disease

5. Uric acid levels will be raised in gout.

6. If sarcoid is suspected, a Kveim's test is required.

7. In all cases a full blood count and ESR should be done.

8. Salivary flow rates will be less than 0.5ml/min in Sjogren's disease.

9. The Schrimer's test also show a decrease in tearing (<5mm in 5 min)

RADIOLOGY:

Plain film radiology

a. Antero-posterior (normal and soft tissue exposure)

b. Tangential

c. Lateral

d. Lateral-oblique view are useful for showing calculi and soft tissue swelling.

Sialography

Tumors produce a mass effect.

Angiography

This is some times required in the investigation of tumors of the parapharyngeal space in order to differentiate salivary gland tumors from chemodectoma of carotid or a nerve sheath tumor both of which have a characteristic tumor circulation.

CT & MRI

For parotid, they are the most helpful imaging techniques. They will confirm that the mass being investigated is indeed intrinsic to the gland. They accurately image the borders of the tumors and show where it is well circumscribed and benign or diffuse invasive and malignant. In addition they show the relationship of the tumors to other anatomic structures which help with the planning of subsequent surgery.

MRI can be formulated in both axial and coronal planes giving even better anatomical information. When carefully preformed and analyzed, MRI can provide information about the facial nerve and its anatomical relationship to the tumors.

Contrast enhanced studies may allow the discrimination between the gland and the metastatic lymph node.

ULTRASONOGRAPHY

It helps to differentiate between the solid and cystic lesions.

FNAC (Fine needle aspiration cytology)

Evidence suggest that provided the needle gauge does not exceed 18G, there is no risk of seedling viable tumor cells. Although advocates of this technique claim high accuracy and specificity, there is inevitably a high risk of sampling errors.

Open biopsy

Open surgical biopsy of intrinsic neoplasm of parotid is absolutely contraindicated. At least 75% of all parotid neoplasm will prove to be benign pleomorphic adenoma. This tumor which is only poorly encapsulated is very tense and if an incision is made into its contents, the tumor burst into the surrounding tissue planes and it is impossible to eradicate the microscopic spillage of tumor cells. If this happens the patient will develop multiple local recurrences over many years unless they are subjected to radical postoperative radiotherapy which is best avoided in the management of benign disease.

Clearly if there is skin infiltration or ulceration, an open biopsy is essential to establish in pre-operative diagnosis upon which to plan surgery.

Neither should a Para pharyngeal mass be biopsied through the pharynx. If the mass is chemodectoma, the bleeding will be uncontrollable and if it is a salivary gland tumor, recurrence will be unacceptable.

Excision biopsy is indicated if there is a parotid mass, FNAC positive or equivocal, suspicion of malignancy/mixed tumor.

If percutaneous biopsy technique is performed, the biopsy track should be included in any subsequent excision.

SCANNING TECHNIQUES

The early hopes of the salivary gland scanning with Tc 99m pertecnetate have not been fulfilled. The finding that all the tumors were cold apart from Warthin's has not been substantiated in the long term and the technique is accompanied by an unacceptabty large number of false positive and false negative results.

TREATMENT

BENIGN TUMORS

The treatment of benign tumor of parotid has passed through several phases during the past 30 years. Enucleation carried a high recurrence rate and so it was followed by enucleation and post operative irradiation. This policy was often unacceptable in the young who were not only given a long time for potential and undoubted recurrences but the risk of radiation induced cancer was added. Recuurence rate were much lower in those series in which enucleation meant not merely extra capsular removal of the tumor, but removal of mass together with a good cuff of normal parotid tissue.

Since a proportion of facial nerve weakness was due to these techniques especially extra capsular enucleation as well as the other risks, total superficial parotidectomy was next advocated. This was very successful in terms of prevention of recurrence and the nerve was safe in the hands of skilled operator because the first step in the operation is identification of the facial nerve and its two main branches. It became evident, however that the procedure was too often extensive e.g. removal of the upper portion of the parotid gland for a small tumor at the ear lobe seems unnecessary. So some surgeons perform a hemisuperficial parotidectomy (i.e. all the parotid tissue lateral to one main branch either upper or lower of the nerve.)

If the tumor involves deep lobe, it is treated by total parotidectomy with the preservation of the nerve.

MALIGNANT TUMORS

If the tumor is malignant, total parotidectomy with the preservation of the nerve is indicated, though it is a piece meal procedure. Such cases of malignant parotid tumors arc followed by RT. The involvement of the branch of the nerve requires its removal. In young patients nerve graft should be used to replace the resected nerve segment in the hope of avoiding the long term sequelae of facial nerve palsy. In the event of invasion of nerve by the tumor, any proximal extension of the malignancy to the base of skull should be evaluated and in some cases, resection of the nerve to clear margin in the stylomastoid foramen or in the facial canal may improve survival. If the facial nerve is not involved by the malignancy but the preservation of nerve would result in gross disruption of the tumor, the nerve should be removed and replaced with the nerve graft.

For adenoid cystic carcinoma, supra radical surgery is not advocated. This tumor although probably fatal in the long is compatible with a useful 10 year survival rate. It is difficult therefore to justify extensive mutilating surgery without offering a cure. Adenoid cystic carcinoma whose macroscopic margin remain within the parotid are treated by total parotidectomy. For more extensive tumors radical dissection with as wide margin as is anatomically appropriate while being compatible with reasonable rehabilitation followed by radical RT will ensure the local control of tumor. The RT field should include the skull base in order to control the perineural tumor extension.

TREATMENT OF THE NECK

The treatment of the neck in patients with malignant disease depends on the histological type and the grade of the tumor and its risk of metastatic disease or the presence of metastatic disease itself. Node positive necks are treated by the appropriate neck dissection. RND if there is involvement of sternocleidomastoid muscle or jugular vein or modified or selective neck dissection depending on the site of metastasis. Although elective or prophylactic neck dissection are not as frequently necessary as in mucosal malignancy, they are indicated in high grade mucoepidermoid carcinoma, squamous cell carcinoma and high grade adenocarcinoma.

COMPLICATIONS OF SURGERY AND THEIR MANAGEMENT

The two most important complications are;

1. Facial nerve paralysis
2. Frey's syndrome

The less common complications include

1. Bleeding and hematoma formation
2. Flap necrosis
3. Salivary fistula

4. Amputation neuroma of divided great auricular nerve

1. FACIAL NERVE PARALYSIS

Partial weakness of the facial muscles is quite common and is recovered if the facial nerve is identified and preserved at operation. There are various methods of identifying and preserving the facial nerve intraoperatively which prove useful to minimize the post operative weakness.

Methods available to prevent facial nerve injury

- **lntravital staining** of the parotid gland with 2-5% methylene blue solution.
- **Neurophysiological monitoring** of facial nerve during parotid surgery using two different 2 channel EMG units.
- **Familiarity** with the common variations in the facial nerve anatomy.

Management

In transient weakness with no obvious injury-Reassurance.

In cases where division has occurred, facial nerve graft/suturing should be done. For practical purpose, a graft is indicated if the tension between the stumps is such as to break a 10% nylon suture when an attempt is made to anastamoze the severed ends. This **ten rule** serve as guide. Grafting can be done using either greater auricular / sural nerve.

The principles to be observed in nerve grafting

- The best suit graft is the greater auricular nerve. It is easily accessible, upto 8cm can be removed, it has two branches of suitable diameter to anastamoze to the upper and lower division

- There should no tension at the anastamosis

- No scar tissue should intrude at the anastamosis and so the sheath should be cut back and only a minimal number of sutures used.

- The use of operating microscope is advisable to allow inter-fascicular repair.

Other technique involve anastamosing the proximal hypoglossal nerve to the distal branches of the seventh nerve. Most recently, free tissue transfers of the gracilis muscles has been successfully used.

Crossed nerve grafts, bringing fibres from the normal side of the "face to the paralysed side.

2. FREY'S SYNDROME

Subjective gustatory sweating and flushing of the face,which appear following parotidectomy, following secretory stimulation of salivation. It manifests between 3months to 2 years after surgery.

The condition follows surgery in the region of parotid gland, but may follow accidental injury to parotid. It is thought that following injury to the auriculotemporal nerve, post ganglionic parasympathetic fibres from the otic ganglion get united to the sympathetic nerve from the superior cervical ganglion destined to supply the vessels and sweat glands of the skin .

Management

- Reassurance
- Antiperspirants
- Surgery in <10% to interrupt the parasympathetic reflex arc and is best done by turning back the ear drum and dividing the Jacobson's nerve which runs over the promontory of middle ear (tympanic neurectomy)

3. **BLEEDING** is rare, and is usually venous from the retroniandibular vein and can be easily controlled.

4. **NECROSIS OF SKIN** has been noted in the elderly at the junction of the posterior extension and the main pre-auricular incision. The best way to avoid this complication is to ensure that the two incisions meet at 90° angle.

5. Development of **AMPUTATION NEUROMA** of the divided grater auricular nerve.

6. **SALIVARY LEAK** is a very common complication that will mostly heal spontaneously except a few which will need exploration.

ROLE OF RADIOTHERAPY

Complete resection of tumor, even when the extirpation is radical, may not be possible because some tumors like adenoid cystic carcinoma tends to infiltrate perineural space and some tumors extend for a distance from the apparently encapsulated tumor. Cancer clearance may not be adequate because of the conservative surgery with preservation of facial nerve, where there is nerve infiltration is widely followed. All these factors resulted in a local recurrence of 24-54%. The post operative RT with 5000-7000 rad resulted in decline of recurrence to 14%.

All the factors favored the post operative radiation an essential adjunct to surgery, as radiotherapy can take care of the residual malignant disease which is minimal or microscopic and often unrecognized.

The indications for radiotherapy are the following: (TAPEY et al M.D.Anderson Hospital).

- Recurrence disease after primary surgical treatment.
- Unresectable tumors.
- Irradiation after excision with following situation.

1. After parotidectomy for low grade tumors when the surgical margins are considered questionable or inadequate.

2. After parotidectomy for high grade tumors.

3. After complete removal of recurrent tumors of all degree of malignancy.

The radiation dose is usually 5500-6000 rads in 6weeks duration, usually treatment is started 10 days after surgery provided the skin is intact and no nerve graft has been done. If nerve graft has been done, the RT is deferred till the recovery of the muscles unless there is obvious recurrence. Radon seeds, radium needle can be used as interstitial irradiation. Preoperative RT in the doses of 1200-3500 rads is very helpful to reduce the tumor size in radiosensitive tumors, namely adenoid cystic tumor and acinic cell tumor.

The prognosis depends on:

- Histological type
- Facial nerve involvement, patients presenting with facial nerve palsy have a poor prognosis.
- Lymph nodal involvement has a poor prognosis.

The 5 - year survical rates for different tumors are:

1.	malignant mixed tumor	55%
2.	low grade mucoepidermoid carcinoma	96%
3.	high grade mucoepidermoid carcinoma	14%
4.	adenoid cell carcinoma	40%
5.	squamous cell carcinoma	36%
6.	acinic cell carcinoma	82%
7.	solid adenocarcinoma	48%
8.	undifferentiated tumor	24%

ROLE OF CHEMOTHERAPY

In occasions, methotrexate or 5 FU may produce regression. Such treatment is often disappointing and serves late palliation. . Perfusion of advanced cases with cyclophosphamide administrated by retrograde catheter in the superficial temporal artery has produced marked regression in few tumors.

MATERIALS AND METHODS

Our study conducted at Kilpauk Medical College and Hospital (KMCH) during the period from September 2004 to September 2006, included those patients who attended the General Surgical clinics for the first time with complaints of parotid swelling. The selection of the patients has been done at random included both the sexes and all age groups.

These patients were subjected to thorough clinical examination. All the basic investigations necessary for anaesthetic assessment and specific investigation for confirming the diagnosis namely FNAC were done. CT scan was also done for appropriate patients. A review of 36 patients was done. Out of 36 patients 19 were male and 17 were female. A thorough analysis of the incidence rates, (according to age & sex), the symptomatology, pathology, and treatment adopted was done.

OBSERVATION

An analysis of 36 cases of parotid neoplasm was done. Out of 36 cases included in the study, 24 cases were pleomorphic adenoma, 4 cases were mucoepidermoid carcinoma, 4 were adenocarcinoma, 1 case was adenoid cystic carcinoma, 1 case was malignant mixed tumor and 2 other cases noted Incidence rate of various types tumor

Tumor	Present KMCH study	%
BENIGN:		
Mixed tumors	24	96
Warthin's	-	-
Others	1	4
TOTAL	**25 cases**	
MALIGNANT:		
Mucoepidermoid	4	36.3
Adenocarcinoma	4	36.3
Acinic cell tumor	-	-
Adenoid cystic carcinoma	1	9
Squamous cell carcinoma	-	-
Malignant mixed tumor	1	9
Undifferentiated	-	-
Others	1	9
TOTAL	**11 cases**	

BENIGN TUMORS

Out of the 25 benign tumors, 24 were pleomorphic adenoma and 1 case was non -specific lymphadenitis in our study.

Of the 24 cases of pleomorphic adenoma, 13 were male patients amd 11 were female patients, 13 patients had tumor in from the right parotid and 11 patients had tumors from the left parotid.

No patient had bilateral tumors. Obviously there is no sex or side predilection.

AGE AND SEX INCIDENCE

The age wise and sex wise distribution of patients with benign parotid tumors is as follows:

Age	Male	%	Female	%	Total	%
0-10	-	-	-		-	-
11-20	-	-	-		-	-
21-30	-	-	1	4	1	4
31-40	5	20	3	12	8	32
41-50	6	24	4	16	10	40
51-60	2	8	3	12	5	20
>60	-	-	1	4	1	4
TOTAL	**13**		**12**		**25**	

Males = 13/25 = 52% Females = 12/25 = 45%

The maximum number of patients occurred in the age group 41-50, for all patients FNAC had done preoperatively and all the reports were pleomorphic adenoma, which was later confirmed by surgery that 24 cases were pleomorphic adenoma except one which was turned out to be non-specific lymphadenitis.

PRESENTING SYMPTOMS

The presenting symptom of the patients with pleomorphic adenoma was swelling in the parotid region. 3 patients had associated pain. There was no skin involvement and fixity to deep structures. The presenting symptomatology was as follows:

Swelling	25/25	100%
Swelling& pain	3/25	12
Swelling with facial nerve weakness	0	_
Swelling & neck nodes	0	-
Involvement of skin	0	-

DURATION OF SYMPTOMS

The majority of patients had symptoms for more than 1 year. A patient had symptom for about 11 years.

Duration	No of patients	%
< 1 year	1	4
For 1 year	3	12
For 2 years	5	20
For 3 years	8	32
For 4 years	4	16
For 5 years	2	8
5-10 years	1	4
>10 years	1	4

SURGERY AND ITS COMPLICATIONS

Surgery- SCP	25/25	100%
Facial nerve weakness 1.Post op 2.Recovered 3.Persistent	 4/25 3/4 1/4	25%
Frey's syndrome	-	-
Fistula	2	8%
Flap necrosis	1	4%
Wound infection	1	4%

MALIGNANT TUMORS

Out of the 36 cases, 11 cases were malignant parotid tumors. Of this 11 cases, 4 were mucoepidermoid carcinoma, 4 were adenocarcinoma, 1 was adenoid cystic carcinoma, 1 was malignant mixed tumor and 1 was malignant clear cell hidradenoma. Of these 11 cases, 6 cases were male patients and 5 were female patients. 6 patients had tumors in the right parotid and 5 patients had tumors in the left parotid. No patients had bilateral tumors. Obviously, like in benign parotid tumors, there is **no sex or side predilection.**

AGE AND SEX INCIDENCE

The age wise distribution of the patients with malignant parotid tumors were as follows:

Age	Male	%	Female	%	Total	%
0-10	-		-	-	-	-
11-20	-	-	-	-	-	-
21-30	-	-	1	9	1	9
31-40	1	9	-	-	1	9
41-50	2	18	-	-	2	18
51-60	1	9	1	9	2	18
61-70	2	18	2	18	4	32
>70	-	-	1	9	1	9
TOTAL	**6**		**5**			

Male - 6/11 = 55%

Female - 5/11 = 45%

PRESENTING SYMPTOMS

The presenting symptomatology of malignant parotid tumor was as follows:

Swelling	11/11	100%
Swelling & pain	4/11	36%
Swelling with facial nerve weakness	4/11	36%
Swelling with skin involvement	3/11	27%

DURATION OF SYMPTOMS

The majority of patients had symptoms <6 months. The duration of symptoms in malignant parotid tumors was a follows:

Duration	**No of Patients**	**%**
< 2 months	1	9
2-4months	4	32
4-6 months	5	45
> 6 months	1	9

SIGNS

All the malignant parotid swellings were hard in consistency, 3 patients had skin involvement, 5 patients had fixity to deeper structures and 4 patients had neck nodes and one patient with mucoepidermoid carcinoma had distant metastases in the lung.

SIGNS	NO OF PATIENTS	%
Skin involvement	3/11	27
Hard consistency	11/11	100
Fixity	5/11	45
Neck nodes	4/11	32
Distant metastases	1/11	9

FNAC were done for all the patients, it was reported mucoepidermoid carcinoma in 3 cases, adenocarcinoma in 4 cases, adenoid cystic carcinoma in 1 case, malignant mixed tumor in 1 case and these were confirmed by surgery. There was a histologic surprise that FNAC report as pleomorphic carcinoma turned out to be mucoepidermoid carcinoma in HPE report.

SURGERY AND ITS COMPLICATIONS

Surgery 1. TCP 2. TRP	 7/11 4/11	 63% 36%
Facial nerve weakness 1. Post op 2. Recovered 3. Persistent	 6/11 0/11 6/6	 54% 100%
Frey's syndrome	-	-
Fistula	2	18
Flap necrosis	1	9
Wound infection	1	9

DISSCUSSION

A thorough analysis of the 36 cases of tumors occurring in the parotid gland in the following aspects was made.

INCIDENCE

1. According to type of tumors.

2. According to age, sex and side in

- Benign parotid tumors
- Malignant parotid tumors.

II. PRESENTING SYMPTOMATOLOGY

- Benign parotid tumors
- Malignant parotid tumors.

III. DURATION OF SYMPTOMS

- Benign parotid tumors
- Malignant parotid tumors.

IV. ROLE OF FNAC

- Benign parotid tumors
- Malignant parotid tumors.

V.TREATMENT AND ITS COMPLICATIONS

- Benign parotid tumors
- Malignant parotid tumors.

I. INCIDENCE

1. According to type of tumors

The majority of cases occurring in the parotid glands were the pleomorphic adenoma. Literature suggests that 80 % of the tumors occurring in the parotid gland are pleomoiphic adenoma. In the study conducted by the Mayo's clinic, 73% of the tumors were pleomorphic adenoma. In our study conducted at KMCH, the incidence of pleomorphic adenoma was 96% of all benign parotid tumors and 66.66% of all parotid neoplasm.

COMPARISON OF INCIDENCE RATE WITH MAYO's CLINIC

Tumor	Mayoclinic 1940-1970	%	Present MCH Study	%
BENIGN				
Mixed tumors	824	73	24	96
Warthin's	293	26	-	-
Others	15	1	1	4
TOTAL	1132		25	

MALIGNANT:	Mayoclinic 1940-1970	%	Present KMCH Study	%
Mucoepidermoid	62	27	4	36.3
Adenocarcinoma	54	24	4	36.3
Acinic cell tumor	34	15	-	-
Adenoid cystic carcinoma	28	12	1	9
Squamous cell carcinoma	22	10	-	-
Malignant mixed tumor	15	6	1	9
Undifferentiated	11	5	-	-
Others	2	1	1	9
TOTAL	**229**		**11**	

2. Acrcrding to age, sex and side in

- **Benign parotid tumors**

Most of the benign parotid tumors were above the age of 40 years. More number of patients occurred in the age group 41- 50 years than in any other groups. Hence in our study , the **pleomorphic** adenoma of parotid tumors is commoner in the age group between 41-50. this figure correlates with the statistics given in the literature (Bailey and love, Short practice of surgery) which gives a mean age of occurrence of pleomorphic adenoma is 42 years.

Literature suggests that there is equal sex and side incidence for both benign and malignant parotid neoplasm. In our study too there was an equal sex incidence.

COMPARISON OF SEX INCIDENCE WITH

VARIOUS STUDIES

Study	Male	Female	Male: Female
Bottner	10	15	0.6:1
Fray	11	14	0.7:1
Mofarland	184	212	0.8:1
Willis	16	34	0.4:1
Willis & Wilson	30	26	1.15:1
Present study	19	17	1.11:1

- **Malignant parotid tumors**

Majority of the patients were above the age group of 50 years. Literature suggests that there is equal sex and side incidence for both benign and malignant parotid neoplasm. In our study too there was an equal sex incidence.

II. PRESENTING SYMPTOMATOLOGY

- **Benign parotid tumors**

All the benign neoplasm of the parotid gland Presented with swelling in the parotid region, 3 patients had pain over the swelling. No patient had facial nerve weakness or neck node or involvement of skin.

Symptoms	Our Study	%	Wong et al
Swelling	25/25	100%	100%
Swelling & Pain	3/25	12%	5%
Swelling with facial nerve weakness	0	-	5%
Swelling & neck nodes	0	-	-
Involvement of skin	0	-	-

In study conducted *by* Wong et. al, (Hong Kong) which was published in the journal of Royal college of Surgeons, Edinburgh. The percentage of patients with benign neoplasm with facial nerve weakness was 5%; with pain was 5% and no neck nodes or skin involvement.

- **Malignant parotid tumors**

The symptomatology of patients with malignant parotid tumors in our study was as follows; 4 patients with pain, 4 patients with facial nerve wakness,3 patients with skin involvement, 5 patients with fixity, 4 patients with neck nodes and 1 patient with distant metastases.

	Our study	%	Wong et al
Swelling alone	3/11	27.2	32.
Swelling & pain	4/11	36.3	21
Swelling with facial nerve weakness	4/11	36.3	18
Skin involvement	3/11	27.2	15
Hard consistency	11/11	100	88
Fixity	5/11	45.4	28
Neck nodes	4/11	36.3	40
Distant metastases	1/11	9	11

III. DURATION OF SYMPTOMS

- **Benign parotid tumors**

The majority of patients had symptoms for more than 1 year. A patient had symptom for about 11 years.

Malignant Parotid tumors

The majority of patients had symptoms <6 months.

Duration	Our Study	%	Mayo's clinic
1 week - 1 year	12/36	33.33%	33%
1 year - 4 year	20/36	55.55%	33%
>4 year	4/36	11.11%	33%

IV TREATMENT AND ITS COMPLICATIONS

- **Benign parotid tumors**

Out of 25 patients with benign parotid tumors, all the 25 patients had undergone superficial parotidectomy. 4 patients had facial nerve weakness, 3 patients completely recovered, 1 had persistent weakness and was advised physiotherapy. No patient had Frey's syndrome. Two patients salivary leak and were advised only regular dressing, 1 patient had wound infection, and 1 patient had flap necrosis

	Out study	**%**
Surgery - SCP	25/25	100%
Facial nerve weakness ♦Post op ♦Recovered	4/25	16%
Persistent	1/4	25%
Frey's syndrome	-	-
Fistula	2/25	8%
Flap necrosis	1	4%
Wound infection	1	4%

- **Malignant parotid tumors**

Out of 11 patients with malignant parotid tumors, 7 had undergone total conservative parotidectomy and 4 had undergone total radical

parotidectomy. Out of these 6 patients had facial nerve palsy and none of them recovered. No one had Frey's syndrome. 2 patients developed leak and managed conservatively. 1 patient had flap necrosis and 1 had wound infection.

STATISTICAL ANALYSIS

The FNAC is done in all the cases before surgery & HPE after surgery & the results were analysed.

FNAC	Correct Diagnosis	Wrong Diagnosis	Total
Positive	34(a)	2(b)	36(a+b)
Negative	0©	36(d)	36(c+d)

Sensitivity: a/a+cx100	=	34/34x100	=	100%
Specificity: d/b+dx100	=	36/38x100	=	94.7%
Positive predictive value: a/a+bxl00	=	34/36x100	=	94.44%
Negative predictive value: d/c+dxl00	=	36/36x100	=	100%
False negative %: c/a+cxl00	=	0/34x100	=	0%
False positive%: b/b+dxl00	=	2/38x100	=	5.2%

The significance of difference in mean of the results between FNAC & HPE is:

P = 0.0003 (by t test). This indicates the value is significant.

Even though the sample size is very small, the above statistical analysis shows that FNAC is a good diagnostic tool in parotid neoplasms pre-operatively.

CONCLUSION

- Parotid tumors are not an uncommon entity.
- The most common presentation of parotid tumors is painless swelling. Hence any solitary swelling in the parotid gland must be considered as tumor until proved otherwise.
- The most common age group to be involved is between 40 - 50 years.
- There is no sex or side predilection.
- There are no definite predisposing factors for parotid tumors.
- The most common tumor occurring in parotid gland is pleomorphic adenoma. The most common malignant parotid tumors are mucoepidermoid carcinoma and adenocarcinoma.The benign parotid tumor, pleomorphic adenoma present as painless swelling with no evidence of facial nerve weakness and the duration of symptoms is usually more than one year.
- Clinical signs such as hard consistency, fixity, facial nerve palsy are seen most commonly in parotid tumors and hence these features can be used as diagnostic criteria preoperatively.
- FNAC is very effective in the pre operative diagnosis of parotid tumors and it has no complications.
- Post operative facial nerve weakness occurred in 16% with in 25% cases in our study.

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PROFORMA FOR PAROTID TUMORS

NAME: AGE/SEX: IP.NO:

WARD: D.O.A.: D.O.D:

PRESENTING COMPLAINTS :

SWELLING AROUND THE EAR : +/-

PAIN

WATERY DISCHARGE

FEVER

TEAR FROM EYELID/DROOLING OF SALIVA

DEVIATION OF ANGLE OF MOUTH

LOSS OF ASYMMETRY OF FACE

COUGH/HEMOPTYSIS/DYSPNOEA/CHEST PAIN ,

BONEPAIN/FRACTURE/SWELLING FROM BONE

FOCAL NEUROLOGICAL DEFICIT

LOSS OF WEIGHT/APPETIT

PAST H/O :

H/O RADIATION

PERSONAL H/O :

ALCOHOL/ SMOKING

GENERAL EXAMINATION :

BUILD/NUTRITION

PALLOR/ICTERUS/CYANOSIS/CLUBBING/LN/EDEMA

FACIES

LOCAL EXAMINATION :

NUMBER :

SITE :

SIZE :

SHAPE:

SURFACE:

SKIN :

WARMTH/NOT , TENDER/NOT

CONSISTENCY : SOFT/CYSTIC/FIRM/HARD/VARIABLE

MOBILE WITH/WITHOUT CLENCHING THE TEETH/FIXED

BIMANUAL PALPATION OF GLAND :

MASTER CHART

S. No.	Name	Age / Sex	IP.No.	Swelling	Pain	Facial Palsy	Duration	Side	FNAC	Node	Surgery	Post-op Palsy	Recovery	HPE Report
1.	Srinivasan	36/M	838089	Yes	-	-	1 yr	Left	PA	-	SCP	Yes	Yes	PA
2.	Yuvaraj	42/M	843434	Yes	-	-	3 yrs	Left	PA	-	SCP	-	-	PA
3.	Raman	32/M	845777	Yes	-	-	3 months	Right	MET	-	TP	Yes	Persist	MET
4.	Mani	45/M	843672	Yes	-	-	3 yrs	Right	PA	-	SCP	-	-	PA
5.	Kalivaradhan	35/M	850169	Yes	-	-	3 yrs	Left	PA	-	SCP	-	-	PA
6.	Devaki	67/F	848678	Yes	Yes	Yes	2 months	Left	Adeno	-	TRP	Yes	Persist	Adeno
7.	Ramadass	48/M	847920	Yes	-	-	3 yrs	Right	PA	-	SCP	-	-	PA
8.	Jayaraman	62/M	817430	Yes	Yes	-	3 months	Right	Adeno	-	TP	-	-	Adeno
9.	Periyasamy	55/M	847638	Yes	-	-	4 yrs	Right	PA	-	SCP	Yes	Yes	PA
10.	Syed	38/M	849364	Yes	-	-	2 yrs	Left	PA	-	SCP	-	-	PA
11.	Vilashini	21/F	841283	Yes	-	-	11months	Left	PA	-	SCP	-	-	PA
12.	Malakodi	40/F	846183	Yes	-	-	5 yrs	Right	PA	-	SCP	-	-	PA
13.	Shanmugam	39/M	846217	Yes	-	-	2 yrs	Right	PA	-	SCP	-	-	PA
14.	Thilagam	53/F	845054	Yes	-	-	1 yr	Right	MET	-	TP	Yes	Yes	MET
15.	Hariprasad	49/M	816557	Yes	Yes	-	5 yrs	Right	PA	-	SCP	-	-	PA
16.	Jayanthi	38/F	862514	Yes	-	-	2 yrs	Left	PA	-	SCP	-	-	Non specific lymph adenitis
17.	Shanthi	52/F	820072	Yes	-	-	4 yrs	Right	PA	-	SCP	-	-	PA
18.	Elumalai	48/M	842051	Yes	-	Yes	5 mnths	Left	Adenoid	-	TRP	-	-	Adenoid
19.	Kuppayi	41/F	842110	Yes	-	-	3 yrs	Right	PA	-	SCP	-	-	PA
20.	Solai	55/M	833420	Yes	Yes	Yes	3 months	Right	MMP	Upper	TRP	Yes	Persist	MMT

S. No.	Name	Age / Sex	IP.No.	Swelling	Pain	Facial Palsy	Duration	Side	FNAC	Node	Surgery	Post-op Palsy	Recovery	HPE Report
										deep				
21.	Rajeswari	36/F	830240	Yes	-	-	4 yrs	Left	PA	-	SCP	-	-	PA
22.	Kaliammal	28/F	826516	Yes	-	-	5mths	Left	MET	-	TP	-	-	MET
23.	Rani	32/F	842080	Yes	-	-	1 yr	Left	PA	-	SCP	-	-	PA
24.	Sivaraman	43/M	826430	Yes	-	-	3 mths	Left	Adeno	Upper Deep	TP	-	-	Adeno
25.	Saleem	44/M	820140	Yes	-	-	2 yrs	Right	PA	-	SCP	-	-	PA
26.	Raman	36/M	827509	Yes	-	-	1½ yrs	Left	PA	-	SCP	-	-	PA
27.	Kasthuri	57/F	836408	Yes	-	-	4 yrs	Right	PA	-	SCP	-	-	PA
28.	Sarojammal	71/F	834308	Yes	-	Yes	5 mths	Right	Adeno	Upper Deep	TRP	Yes	Persist	Adeno
29.	Ramani	48/F	821208	Yes	-	-	3 yrs	Left	PA	-	SCP	-	-	PA
30.	Shantha	53/F	835108	Yes	Yes	-	3 yrs	Right	PA	-	SCP	-	-	PA
31.	Saraswathi	61/F	832560	Yes	Yes	-	6 mths	Left	Acinic	Upper Deep	TP	Yes	Persist	Malignant clear cell hidradenoma
32.	Krishnan	41/M	823450	Yes	-	-	3 yrs	Right	PA	-	SCP	-	-	PA
33.	Ragavan	68/M	823976	Yes	-	-	5 mths	Right	MET	-	TP	-	-	MET
34.	Pushpa	47/F	840068	Yes	-	-	3 yrs	Left	PA	-	SCP	-	-	PA
35.	Savithri	66/F	841116	Yes	Yes	-	11 yrs	Right	PA	-	SCP	Yes	Persist	PA
36.	Narayanan	58/M	854108	Yes	-	-	8 yrs	Left	PA	-	SCP	-	-	PA